
CALIFORNIA
CONSERVATION

Department of Conservation

Division of Oil, Gas, and Geothermal Resources

Underground Injection Control Program

Aquifer Exemptions

February 24, 2015

Presentation Overview

Aquifer Exemptions

- Safe Drinking Water Act
- Primacy Agreement
- Aquifer Exemption Criteria
- Aquifer Exemption Process
- Interim Period

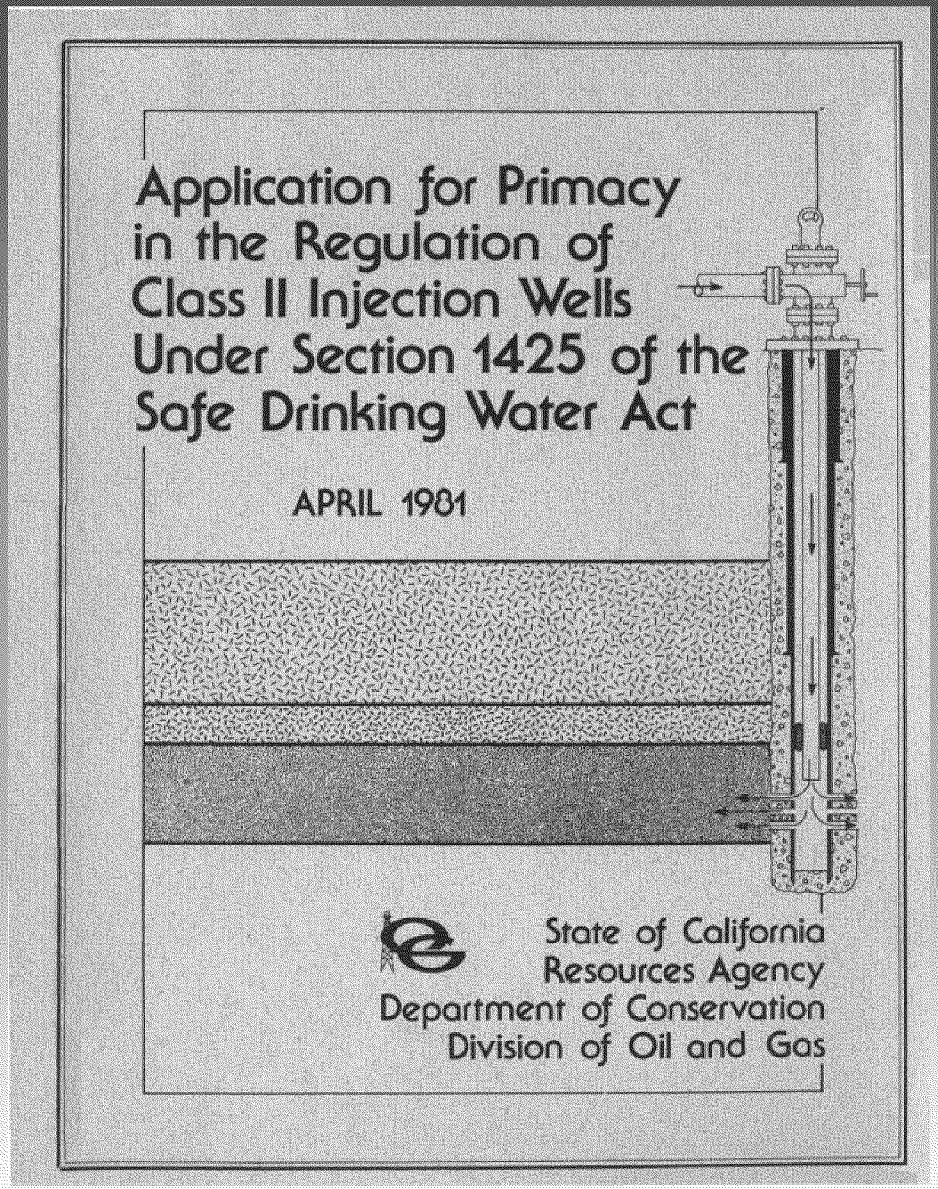
Safe Drinking Water Act

- Act passed in 1974
- Protection of water of less than 10,000 mg/l Total Dissolved Solids (TDS)
- US EPA required to promulgate regulations
- Classes of wells by injection type
- Provide for states to apply for Primacy (regulate under state's program)

Primacy Agreement

- California Primacy Application submitted in 1981
- Based upon State's current (1981) Injection Program
- Included supporting data from California Oil and Gas Fields (1973)

Primacy Agreement - Application



Primacy Agreement - MOA

Underground Injection Control Program
Memorandum of Agreement
Between
California Division of Oil and Gas
and
the United States Environmental Protection Agency
Region 9

I. General

This Memorandum of Agreement ("Agreement") establishes the responsibilities of and the procedures to be used by the Division of Oil and Gas ("Division") and the United States Environmental Protection Agency ("EPA") in administration of wells in the Class II portion ("Class II program") of the Underground Injection Control ("UIC") program in California. In general, this Agreement supplements the program described in the demonstration submitted in accordance with Section 1425(a) of the Safe Drinking Water Act ("1425 demonstration").

After it is signed by the Supervisor and the Regional Administrator, this Agreement shall become effective on the date notice of the Class II program approval is published in the Federal Register. The parties will review this Agreement at least once each year during preparation of the annual program update, during the State-EPA agreement ("SEA") process or at other times as appropriate (e.g. at mid-year review). The annual SEA shall be consistent with this Agreement and may not override this Agreement.

This Agreement may be modified upon the initiative of either party in order to ensure consistency with State or Federal statutory or regulatory modifications or supplements, or for any other purpose mutually agreed upon. Any such modifications or supplements must be in writing and must be signed by the Supervisor and Regional Administrator.

This Agreement shall remain in effect unless EPA determines that the Division's 1425 demonstration is no longer valid. Such a determination by EPA will be in accordance with Section 1425(c) of the Safe Drinking Water Act ("SDWA").

Nothing in this Agreement shall be construed to alter any requirements of SDWA or to restrict EPA's authority to fulfill its oversight and enforcement responsibilities under SDWA or other Federal laws, or to restrict the Division's authority to fulfill its responsibilities under State statutes. Nothing in this Agreement shall require or be construed to require EPA to violate Federal law or the Division to violate State law.

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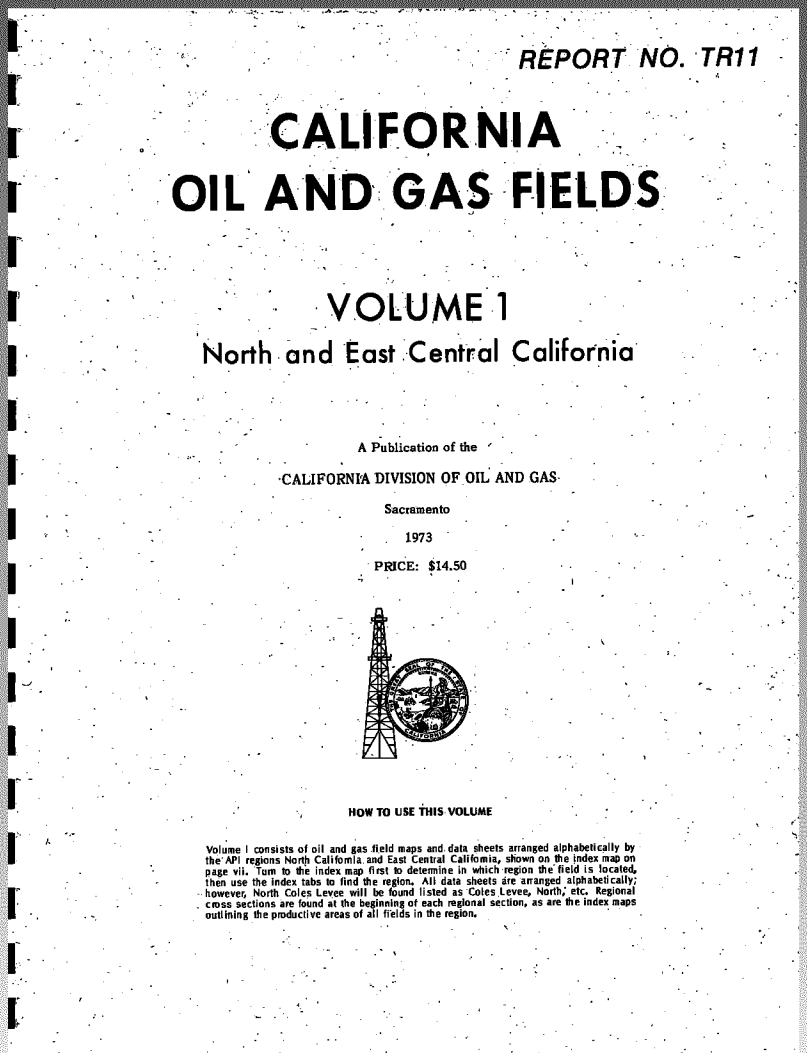
Primacy Agreement – Supporting Data



REPORT NO. TR11

CALIFORNIA OIL AND GAS FIELDS

VOLUME I

North and East Central California

A Publication of the

CALIFORNIA DIVISION OF OIL AND GAS

Sacramento

1973

PRICE: $14.50

HOW TO USE THIS VOLUME

Volume I consists of oil and gas field maps and data sheets arranged alphabetically by the API regions North California and East Central California, shown on the index map on page vii. Turn to the index map first to determine in which region the field is located, then use the index tabs to find the region. All data sheets are arranged alphabetically; however, North Coles Levee will be found listed as Coles Levee, North, etc. Regional cross sections are found at the beginning of each regional section, as are the index maps outlining the productive areas of all fields in the region.

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Primacy Agreement – Supporting Data

INTRODUCTION

This volume is a compilation of oil and gas field geologic maps and statistical data for all fields in the API regions of North California and East Central California (see index map on page vii). It exhibits a departure in format from the original map and data sheet publication which first appeared in October 1960. Aside from the loose leaf format, which will permit planned periodic updating, many other changes have been made. For example, a typical or composite electric log is shown for most fields; and additional statistical data have been added.

This volume was prepared under the supervision of Raymond V. Rothemel, Publications Officer. George J. Borkovich, Northern Region Staff Engineer, coordinated the project, and Simon Cordova, Woodland staff engineer, was the editor of geologic names. Division of Oil and Gas Northern Region engineers in the Bakersfield, Coalinga, Woodland and Santa Maria offices participated in the preparation of the maps and data sheets and other personnel did the drafting, layout, and typing, therefore individual recognition would not be practical here. Contributions by companies and individuals not employed by the division are credited on those map sheets involved.

MAJOR OCCURRENCES OF OIL AND GAS

SAN JOAQUIN VALLEY

Oil and associated wet gas occur largely in the Miocene and Pliocene, with lesser quantities in the Eocene and Pleistocene Series, and very minor quantities in the Oligocene, Jurassic and Cretaceous Systems. Dry gas occurrence is minor, being found primarily in the Pliocene, Eocene and Upper Cretaceous.

SACRAMENTO VALLEY AND OTHER NORTHERN CALIFORNIA BASINS

Dry gas occurs largely in the Eocene, Paleocene and Upper Cretaceous, with a lesser amount in the Pliocene and Miocene Series. Oil, which is very minor, occurs in Pliocene, Miocene, Eocene, Paleocene, and Upper Cretaceous strata.

EXPLANATIONS

MAP SHEETS

Typical log - A single electric log of a typical well in a particular oil or gas field. For convenience, long sections not needed for correlation purposes may have been removed in some logs. This is shown by the "∿∿∿" symbol.

Composite log - Consists of a composite of two or more electric logs and is representative of the stratigraphy of a particular oil or gas field. Sections removed are shown by the symbol "∿∿∿".

Note: Some typical or composite logs may be taken from wells outside administrative field boundaries and may therefore have greater depth than the deepest well in the field.

Productive area - Productive area may be shown in one of two ways:

1) By inference from well symbols placed on the contour map.
2) By shading (see legend) on contour map. Shading is also used on cross sections to indicate productive zones.

Productive area, as shown on contour maps, is the ***maximum*** productive area as of January 1, 1973. Productive area shown on index maps is generalized.

Contour map - Depth datum is sea level.

CALIFORNIA CONSERVATION

Primacy Agreement – Supporting Data

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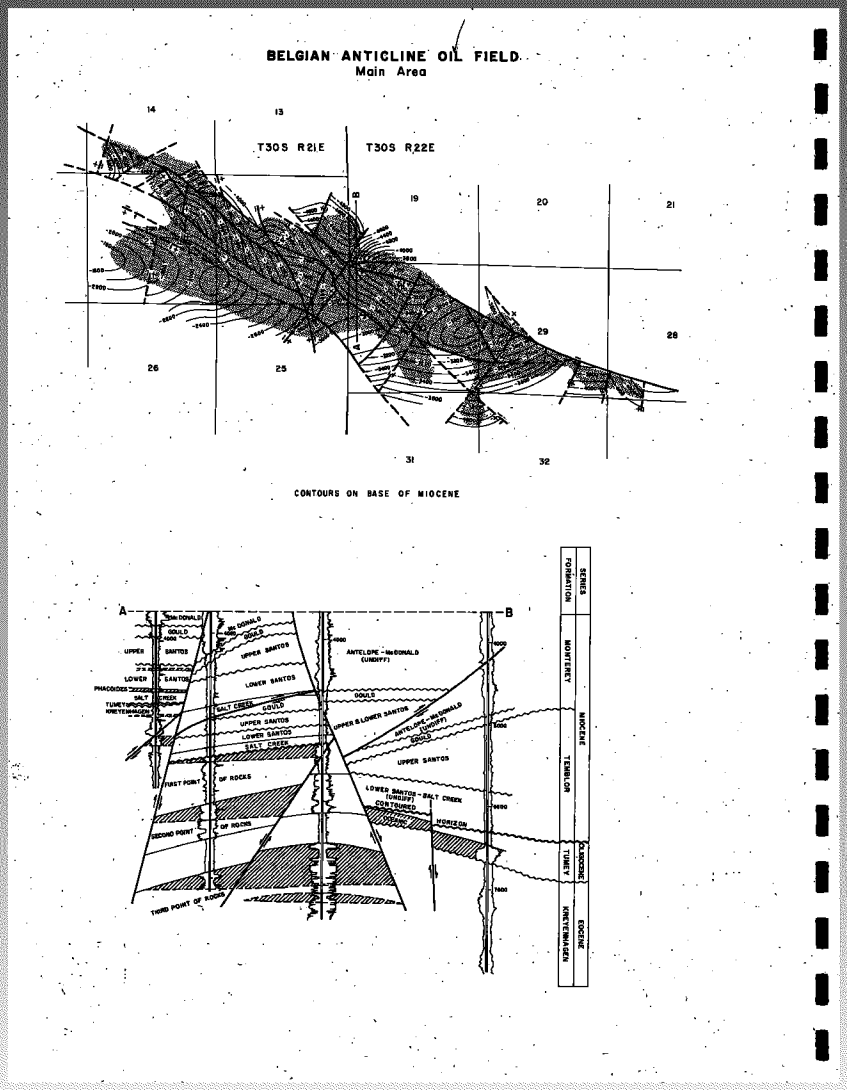
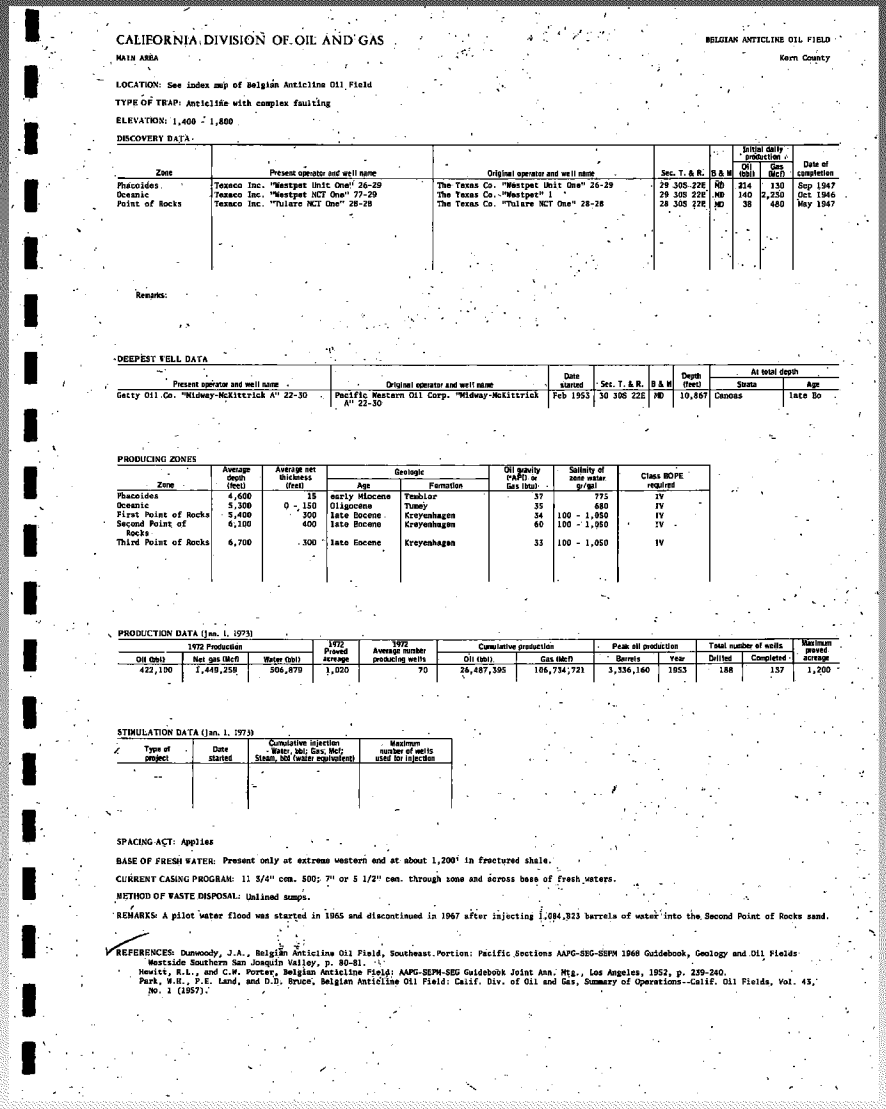
Primacy Agreement – Supporting Data



Primacy Agreement – Supporting Data



CALIFORNIA DIVISION OF OIL AND GAS

BELGIAN ANTICLINE OIL FIELD

MAIN AREA

Kern County

LOCATION: See index map of Belgian Anticline Oil Field

TYPE OF TRAP: Anticline with complex faulting

ELEVATION: 1,400' - 1,800'

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Phacoides	Texaco Inc. "Westpet Unit One" 26-29	The Texas Co. "Westpet Unit One" 26-29	29 30S 22E	MD	214	130	Sep 1947
Oceanic	Texaco Inc. "Westpet NCT One" 77-29	The Texas Co. "Westpet" 1	29 30S 22E	MD	140	2,250	Oct 1946
Point of Rocks	Texaco Inc. "Tulare NCT One" 28-28	The Texas Co. "Tulare NCT One" 28-28	28 30S 22E	MD	38	480	May 1947

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Getty Oil Co. "Midway-McKittrick A" 22-30	Pacific Western Oil Corp. "Midway-McKittrick A" 22-30	Feb 1953	30 30S 22E	MD	10,867	Canoas	late Eo

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class ROPE required
Phacoides	4,600	15	early Miocene	Temblor	37	775	IV
Oceanic	5,300	0 - 150	Oligocene	Tumey	35	680	IV
First Point of Rocks	5,400	300	late Eocene	Kreyenhagen	34	100 - 1,050	IV
Second Point of Rocks	6,100	400	late Eocene	Kreyenhagen	60	100 - 1,050	IV
Third Point of Rocks	6,700	300	late Eocene	Kreyenhagen	33	100 - 1,050	IV

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak all production: Barrels	Peak all production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
422,100	1,448,258	506,879	1,020	70	26,487,395	106,734,721	3,336,160	1953	188	157	1,200

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
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SPACING ACT: Applies

BASE OF FRESH WATER: Present only at extreme western end at about 1,200' in fractured shale.

CURRENT CASING PROGRAM: 11 3/4" cem. 800; 7" or 5 1/2" cem. through zone and across base of fresh waters.

METHOD OF WASTE DISPOSAL: Unlined sumps.

REMARKS: A pilot water flood was started in 1965 and discontinued in 1967 after injecting 1,084,823 barrels of water into the Second Point of Rocks sand.

REFERENCES: Dunwoody, J.A., Belgian Anticline Oil Field, Southeast Portion: Pacific Sections AAPG-SEG-SEPM 1968 Guidebook, Geology and Oil Fields Westside Southern San Joaquin Valley, p. 80-81.
Hewitt, R.L., and C.W. Porter, Belgian Anticline Field: AAPG-SEPM-SEG Guidebook Joint Ann. Mtg., Los Angeles, 1952, p. 239-240.
Park, W.H., P.E. Land, and D.D. Bruce, Belgian Anticline Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 43, No. 1 (1957).

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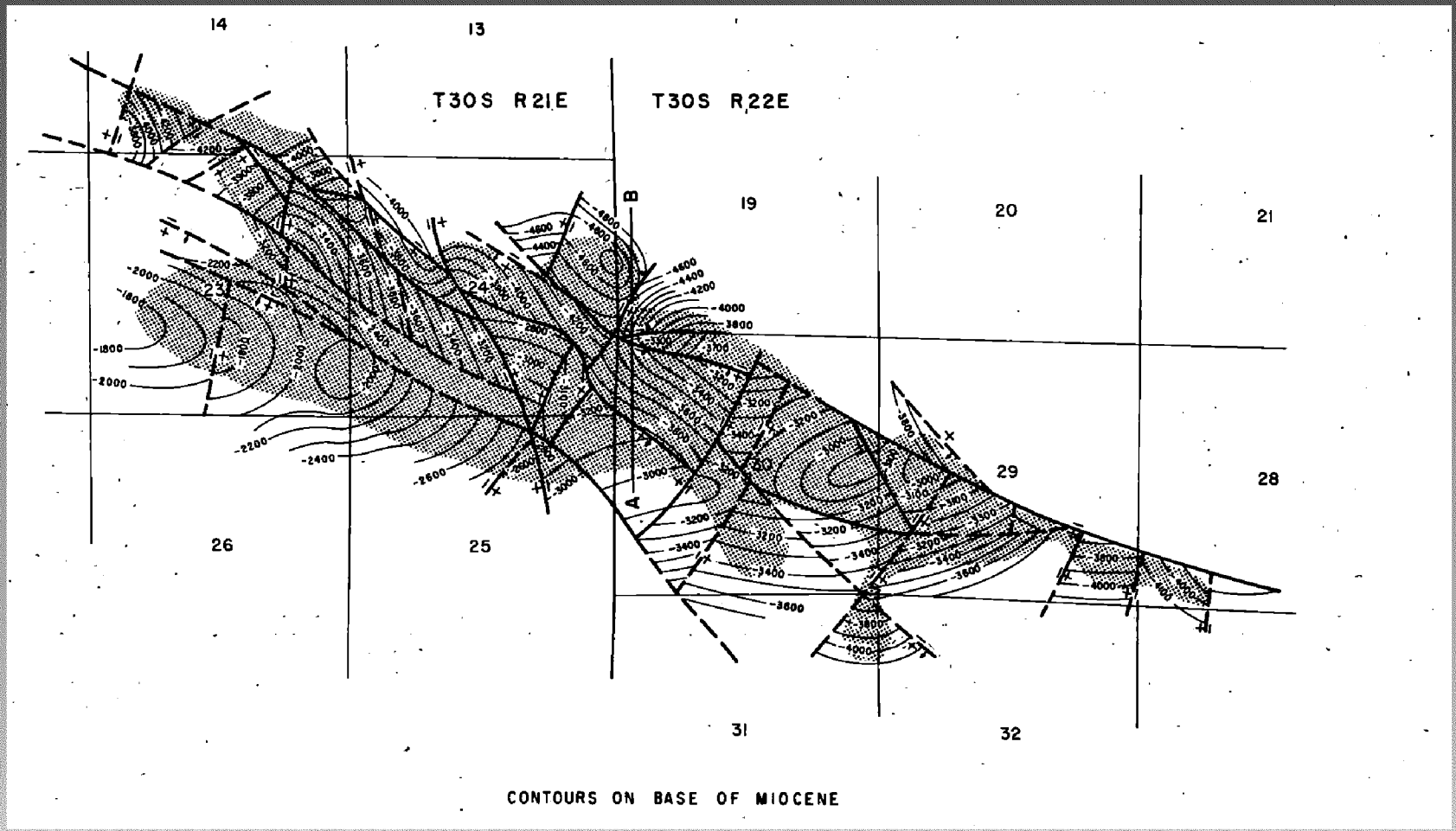
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T30S R21E
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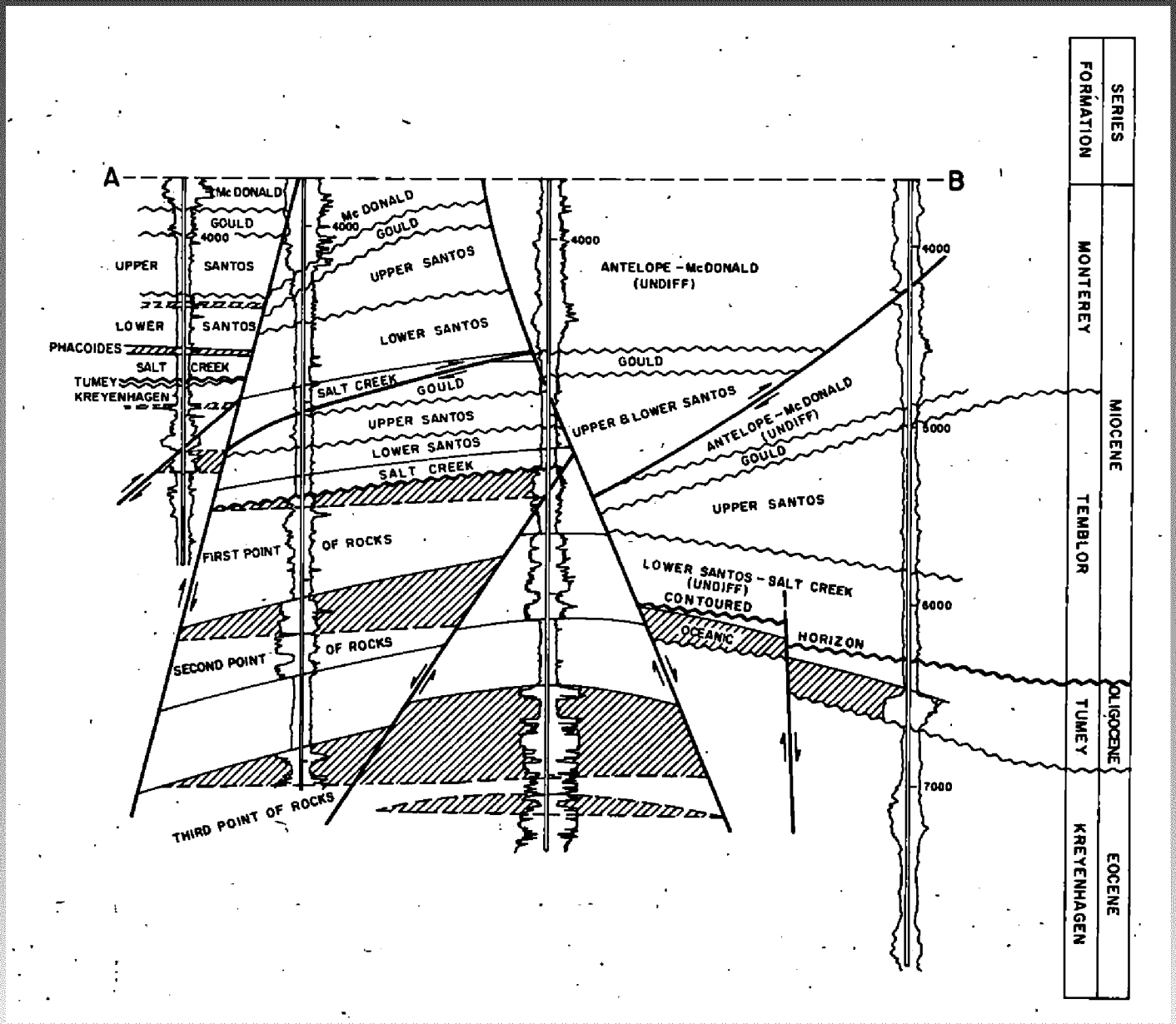
CONTOURS ON BASE OF MIOCENE



EPA Aquifer Exemption Criteria

EPA Aquifer Exemption Criteria

An aquifer or a portion thereof may be determined to be an exempted aquifer for Class I-V wells if it meets the criteria in paragraphs (a) —(c) below. Other than EPA approved aquifer exemption expansions that meet the criteria set forth in 40 CFR 146.4(d), new aquifer exemptions for Class VI wells shall not be issued.

146.4: (a) Not currently used as a drinking water source and:

(b)

(1) It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or Class II operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible; **or**

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; **or**

(3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; **or**

(4) it is located over a Class III well mining area subject to subsidence or catastrophic collapse; **or**

(c) TDS is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

State Water Board Review Criteria

State Water Board Review Criteria

The State Water Boards will review and evaluate the aquifer exemption application(s) in accordance with the following criteria:

1) Identification of underground sources of drinking water and exempted aquifers (Code of Federal Regulations, Title 40, Section 144.7)

2) U.S. Environmental Protection Agency (EPA) Guidance for Review and Approval of State Underground Injection Control (UIC) Programs and Revisions to Approved State Programs (Attachment 3: Guidelines for Reviewing Aquifer Exemption Requests)

State Water Board Review Criteria

3) EPA Aquifer Exemption Checklist

4) Technical demonstration by operator that the waste will remain in the exempted portion of the aquifer(s)

5) A review of current and future beneficial sources of water (e.g. domestic, municipal, irrigation, industrial)

6) Pertinent elements of Regional Water Board Basin Plan(s)

State Water Board Review Criteria

Upon conclusion of the State Water Boards review, the State Water Boards will provide one of the following findings:

State Water Board Review Criteria

a. If the State Water Boards concur with DOGGR that the aquifer exemption application meets the review criteria, the State Water Board will send a letter of concurrence to DOGGR, and copies to the affected operator(s). This is anticipated to take 5 days after concurring with DOGGR's recommendations.

State Water Board Review Criteria

b. If the State Water Boards concur that only portions of the aquifer exemption application meet the review criteria, the State Water Boards will send a letter to DOGGR and copies to the affected operator(s) requesting additional information. This is anticipated to take 5 days after making a determination.

State Water Board Review Criteria

c. If the State Water Boards conclude that the aquifer will not meet the criteria of an aquifer exemption, the State Water Boards will send a letter of its findings to DOGGR, with copies of these findings being sent to the affected operator(s). This is anticipated to take 5 days after making a determination.

Aquifer Exemption Process

Aquifer Exemption Process

If an operator, or operators, wish to inject Class II fluid into a zone where the water quality is less than 10,000 mg/l TDS, and the zone has not been previously exempted, DOGGR will request data from the operator(s) to provide supporting documentation necessary for meeting aquifer exemption criteria as specified in 40 CFR 146.4

Aquifer Exemption Process

DOGGR's evaluation of the supporting documentation provided by the operator(s) must verify:

A) The aquifer does not currently serve as a source of drinking water.

This evaluation will/must include a survey of all water wells in the area of the proposed injection that are likely to have hydrologic conductivity with the zone of injection. Although the area of proposed injection may be smaller than the area of hydrologic conductivity, the supporting documentation must include data and hydrologic modeling that indicates the impacts of injection into the formation would not impact wells in the surrounding areas. Although this criteria states that the aquifer does not serve as a sources of drinking water, the State will evaluate this criterion to a higher standard, that of evaluating whether the aquifer is currently being used for beneficial uses.

And

B) The aquifer cannot now, and will not in the future, serve as a source of beneficial water because:

1) The aquifer is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.

Supporting documentation must include such data as: production data and/or maps generated using geophysical logs to indicate the oil/water contact of historic and/or current hydrocarbon production. To extent the area to include future hydrocarbon production, the supporting documentation must include definitive data of potential future hydrocarbon production.

Or

2) The aquifer is situated at a depth or location that makes recovery of water for drinking water purposes economically or technologically impractical.

Data must be provided that clearly indicates the depth of all impacted water that has the potential to be used for beneficial purposes. Based on current data, water wells are being drilled deeper and deeper because of the drought. Many wells are being drill below 4,000 feet. Because wells are being drilled increasingly deeper, supporting data must be current and accurate.

Or

3) The aquifer is so contaminated that it would be economically or technologically impractical to render that water fit for beneficial use.

The drought has forced people of the State to use water of lesser quality to meet their needs. Data provided to support the claim that the water is so contaminated that it would be economically or technologically impractical to render that water fit for beneficial use must be current and accurate.

Although the initial application will be evaluated by DOGGR, the State Water Resources Control Board and the Regional Water Quality Control Board(s) will be providing their expertise in the final analysis.

Or

4) The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and other water quality constituents render the water to be of a certain quality that it is not reasonably expected to be used for beneficial uses.

During the process of evaluating the supporting documentation, DOGGR will confer with the State Water Boards, and the operators as necessary to ensure the supporting data is accurate, up-to-date, and complete.

Once DOGGR is satisfied with the supporting documentation, all supporting documentation, an application, and a draft letter to the US EPA requesting an aquifer exemption will be forwarded to the State Water Boards for comment. If necessary, DOGGR and the State Water Boards will meet and discuss the supporting documentation. Where appropriate, the operators affected by the proposed aquifer exemption may be included in meetings to clarify or to provide additional supporting documentation. If both DOGGR and the State Water Boards are in agreement, and if appropriate, the State Water Boards will provide a written concurrence to the application.

Once DOGGR and the State Water Boards have reached an agreement to forward an aquifer exemption application to the US EPA, DOGGR will proceed with providing the appropriate public notification and solicit comments on the proposed aquifer exemption. Upon conclusion of the public comment period, and once comments have been appropriately addressed, DOGGR will forward the application to US EPA – Region 9.

Interim Process

Interim Process

Within the next 24 months, no later than February 15, 2017, all injection into non-exempt USDWs will be addressed, and beyond that date no injection will be permitted into a non-exempt USDW.

Interim Process

For each project application, the review and approval process will be based on each project's ability to demonstrate how it individually meets the requirements established for aquifer exemptions, with clear recognition that a well-defined zone within an aquifer might meet the requirements for exemption but the remaining portion of the aquifer might require protection. A showing that the aquifer likely meets the criteria for exemption will be necessary, but not always sufficient.

Interim Process

Treatment of project applications will depend on the nature of the project and characteristics of the target zone:

1) *Water disposal wells into sub-3,000 TDS non-exempt aquifers.* These applications will be permitted only if an aquifer exemption is in place. Aquifer exemptions for this class of aquifer require approval after public comment periods from US EPA headquarters in Washington DC. One attribute that will be necessary is a demonstration that the zone is or has strong potential to be hydrocarbon producing within the zone of interest, and the water chemistry is such that no beneficial use can be contemplated (e.g., it contains excessive boron or arsenic). Otherwise, owing to the quality of the water, the State Water Resources Board will not allow an aquifer exemption to proceed.

Interim Process

2) *Water disposal wells into 3,000-10,000 TDS aquifers.* These applications will be considered. Project applications for water disposal into aquifers with TDS levels close to but greater than 3000 TDS will likely receive heightened scrutiny in comparison to those for aquifers with TDS levels close to but below 10,000 TDS. In addition, the chemistry of the water to be injected will be considered in the context of the water quality in the aquifer.

Interim Process

3) *Enhanced oil recovery into hydrocarbon-bearing, sub-3,000 TDS aquifers.* Owing to concern for water of potential beneficial use, this class will require a detailed analysis of the aquifer, delineation of hydrocarbon zones, and which portions of the aquifer might be candidates for exemption.

Interim Process

4) *Enhanced oil recovery into 3,000-10,000 TDS aquifers.* These applications will be considered. Project applications for water disposal into aquifers with TDS levels close to but greater than 3000 TDS will likely receive heightened scrutiny in comparison to those for aquifers with TDS levels close to but below 10,000 TDS.

The Division and the Water Boards are presently evaluating all injection into non-exempt USDWs and the 11 aquifers historically treated as exempt to identify potential for such impacts. The evaluation includes screening for water wells in the area of the injection well and collection and review of data regarding the water quality and depth of the aquifer where injection is occurring. Where the evaluation indicates that a threat to a present source of drinking water exists, the Division will issue an emergency order to the operator to cease injecting immediately.

In conclusion, the Division, Water Boards, and US EPA are working closely together to address potential impacts to water of beneficial use and to work collaboratively with stakeholders to meet the State's natural resource needs.

Questions?

www.conservation.ca.gov